AFTER ACTION REPORT
FOR
DAM BREACHING

Pigg River Power Dam
Franklin County, Virginia

January 2018

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1.0 INTRODUCTION

1.1 BACKGROUND

Constructed in 1915 by the Rocky Mount Power and Light Company for power generation, Rocky Mount Power Dam (dam), also known as the Pigg River Power Dam, measured 25 feet (ft) high by 204 ft long (Figure 3, Photos 1, 2) and impounded 60 acre-ft of water over 25 surface acres (Figures 1, 2, Photos 1, 2). The dam was subsequently sold to Appalachian Electric Power in 1935 and decommissioned sometime in the middle 1950s.

The U.S. Fish and Wildlife Service (Service) developed an interest in removal or breaching of the dam due to the presence of the federally listed endangered Roanoke logperch (*Percina rex*). The recovery plan for the Roanoke logperch (Service 1992) lists construction of impoundments as one of the major causes for the species decline. Breaching the dam removed the last impediment to fish passage within a 75-mile reach of the Pigg River from the headwaters downstream to Leesville Reservoir, and also restored 2.2 miles of aquatic instream habitat impounded upstream of the dam for the Roanoke logperch and smallmouth bass (*Micropterus dolomieu*). Improvements to an additional mile upstream of the impoundment (for a total of 3.2 miles above the dam) and 5 miles downstream of the dam are resulting from the development of increased complexity of instream habitat, riparian vegetation establishment, and increased competency of the river to transport sediment. The remaining 45-mile river segment downstream to Leesville Reservoir are also improving with regards to channel habitat, stability, and complexity through restored continuity to the headwaters. Other benefits of the project include the restoration of flood attenuation, public infrastructure protection for the Rocky Mount Wastewater Treatment Plant and the Route 713 Bridge, removal of a public safety and boating hazard, and creating the conditions necessary for the future establishment of a public access area and county park for recreational fishing and boating.

The Service began working with the Natural Resources Conservation Service, Virginia Department of Game and Inland Fisheries, Franklin County, FishAmerica Foundation and other partners in 2005 to develop a plan for the removal of the dam. Significant progress was made in fundraising to support dam removal through Service and other partner funding. An architectural historic resource survey was conducted (Pezzoni and Associates 2007) and the dam and associated powerhouse were determined to be eligible for the National Register of Historic Places. Sediment quality and quantity sampling and analysis were completed for the legacy sediment impounded behind the dam (Froehling and Robertson 2007). While slightly elevated levels of cadmium and chromium were detected in several samples, above Threshold Effects Limits but below Potential Effects Limits, levels were insufficient to warrant concern from the Virginia Department of Environmental Quality (VDEQ) or the Service (Froehling and Robertson 2007). Pre-removal water quality sampling, a physical habitat assessment, and biomonitoring above and below the dam were completed (Hitt et al. 2009). Further efforts to study and ultimately remove or breach the dam ceased in 2009 due to differences in partner priorities and insufficient funding.

Interest in dam removal or breaching was renewed in 2012 after a change in ownership to the Friends of the Rivers of Virginia (FORVA), a river restoration and access advocacy organization, and in 2013 following removal of Veteran's Memorial Park Dam upstream. On February 2, 2014, shortly after removal of Veterans Memorial Park Dam, an estimated 39,000 tons of coal ash spilled from a containment facility at Duke Energy's Dan River Steam Station into the Dan River in Eden, North Carolina, resulting in ash being transported over 80 miles to the Kerr Reservoir within a few days. Duke Energy began discussions with Federal and North Carolina and Virginia regulatory and natural resource agencies regarding possible voluntary restoration projects to compensate for the loss or injury to natural resources within the upper Roanoke River watershed. Duke Energy expressed interest in projects that were "shovel ready," including the Pigg River Power Dam breaching project. Duke representatives met with FORVA and other conservation partners on October 8, 2015 to discuss the project and remaining requirements for breaching or removal.

Concurrent with those activities, additional funding was provided by the Service to complete several studies needed to support removal or breaching without sediment removal. A Federal Emergency Management Agency required floodplain study was performed (Mattern and Craig 2015). The hydraulic analysis was used to determine impacts of breaching the dam on the adopted Flood Insurance Rate Maps and as a component of the input required for a sediment transport analysis to estimate the sediment transport modes and sediment loads downstream of the dam. The study indicated that removal of the dam would not result in an increase in the base flood elevation at the dam, the existing bridge located just downstream of the dam, at cross sections located downstream of the dam and bridge, and at cross sections located upstream of the dam. A geomorphic and sediment transport analysis (Kris Bass Engineering 2015) concluded in part: the Pigg River is in a disturbed state due to watershed development, human alteration, and sediment imbalances, with greater than 90% of the river downstream of the dam impacted due to sediment transport issues; a (sequential) notching strategy will not be an effective way of controlling the release of sediment and recommended a full dam breach with no notching strategy resulting in the more rapid restoration of the upstream channel and accelerating downstream recovery; the upstream channel could equilibrate in a matter of months, while downstream redistribution of sediments will continue for at least a year, with increases in sediment concentrations after storms expected for several years; and the most significant changes, including several feet of deposition, would be expected just downstream of the dam, resulting in a new baseflow channel with point bars, terraces, and new floodplains. A Memorandum of Agreement was signed among the State Historic Preservation Office (SHPO), FORVA, and the Service on May 2, 2016 authorizing impacts to the historic structure. Final regulatory permitting was completed on August 5, 2016, and SHPO approval of the intensive Phase I architectural survey was received on August 19, 2016. Fish sampling utilizing backpack electroshockers, seines, and dip nets to locate and remove Roanoke logperch in the downstream scour hole prior to construction in compliance with the Service's October 28, 2015 non-jeopardy biological opinion for the project, was completed on August 25, 2016 (Photo 8). No logperch were collected in the scour hole, though 2 were collected in the riffle beneath the Route 712 bridge crossing. FORVA received funding from Duke Energy for the project, including monitoring, on August 29, 2016.

1.2 COMPLETED WORK

One hundred and forty ft of the upper 8.5 ft of concrete across the dam was removed to match adjacent floodplain elevations to restore flood capacity and protect and maintain riparian habitat upstream. Below this floodplain notch, 95 ft (48%) of the center of the dam was removed to restore river flow (Photo 26). The breach size and configuration was designed to match the stable channel dimension for this reach surveyed 100 yards (yd) downstream.

A section of dam 50 ft long on the north side of the Pigg River remains undisturbed to preserve and protect the power house and dam section for historic preservation and interpretation (Photo 26). A 35 ft section of the south side of the dam was also undisturbed and approximately 70% of the base of the dam remains intact (Photos 35 and 35). This approach provided for enhanced maintenance of channel stability, sediment carrying capacity and competency, and preservation of cultural resources, while achieving project goals.

1.3 SITE DESCRIPTION

The Pigg River Power Dam (Photos 1 and 2) is located on the Pigg River in Franklin County approximately 0.5 mile east of the Town of Rocky Mount, in the Piedmont region in southwestern Virginia (Figures 1-3). The dam is constructed on a bedrock outcrop 120 ft upstream of the State Route 712 (Power Dam Road) crossing of the Pigg River. Prior to breaching, the concrete gravity dam measured 25 ft high and 204 ft long, with a top width of 7 ft and a bottom width of 20 ft, not including the buttresses. Additional details of the dam and powerhouse can be found in the architectural description of the dam (Pezzoni and Associates 2007, Hill Studios 2016).

2.0 SITE ACTIVITIES

2.1 SITE PREPARATION

The contractor (Shenandoah StreamWorks LLC) began mobilizing to the site the week of August 8, 2016. Excavators equipped with both hydraulic hammers and buckets, as well as dump trucks were transported to the site. StreamWorks added No. 4 stone to the existing farm field access road leading to the site to support heavy equipment, replacing an 18 inch aluminum culvert pipe at the downslope end of the access road to provide improved drainage from the adjacent slope toward the river and installing silt fencing (Photos 9, 16). A construction causeway/access consisting of riprap, beginning in upland under the Route 712 Bridge and terminating along the downstream face of the dam was started on August 18 and completed on August 23, 2016 (Photo 10).

2.2 DAM BREACHING/CONCRETE REMOVAL

Demolition of the dam began on August 29, 2016 (Photo 11). Initially 1 excavator with a hydraulic hammer was used to begin breaching operations. During the demolition process, concrete demolition debris was used initially to extend the work causeway along the dam face

(Photo 12). After a sufficiently large platform was constructed, an additional excavator was utilized to transfer the remaining concrete rubble to the scour hole on river below the dam to form the base of the proposed wetland restoration area (Photos 13, 17, and 19). The concrete rubble utilized in the causeway widening was also placed in the scour hole prior to placement of soil and organic material within the proposed wetland restoration site. Dam breaching was completed on September 9, 2017 (Photo 19), with the exception of some remaining fine-scale concrete removal along the base of the channel breach (Photo 23), and continued through September 21, 2017, as exposed high points were removed. Approximately 715 yd^3 of concrete rubble was removed during the breaching process.

2.3 WOODY DEBRIS/SEDIMENT REMOVAL

An estimated 3,000 yd^3 of woody debris was located upstream of the dam (Photo 3). Quantities were based upon field observation and previous coring during sediment quantity and quality analysis. During breaching operations, the contractor began removal of the woody material to allow the river channel to return to pre-removal dimensions and completed woody debris removal after breaching was complete (Photos 13 and 15). Woody debris consisted of living trees, trunks and branches at the surface, and degraded into decomposed material at depth. Larger logs and branches were removed and stockpiled at a nearby location (Photo 16), prior to being transported offsite for disposal. Due to the degraded condition of the lower layers of woody debris, substantially less woody debris was removed than the anticipated.

Sediment and decomposed woody debris suitable for vegetation establishment were excavated behind the breach and placed in the scour hole proposed for wetland restoration area immediately downstream of the dam on river right (Photos 17 and 19).

Sediment removed behind the dam to re-establish the channel dimensions, and not utilized in the floodplain wetland restoration below the dam, remained in place to be transported by the river downstream to reestablish natural stream channel pattern; profile and dimension features including channel narrowing, riffles, pools, glides, runs and, bankfull benches (Photos 21, 26, 28, 29, 30, 35, and 36).

An unknown quantity of small and large woody debris was transported downstream during precipitation events during the breaching process and continues to be transported after project completion, as is typical with natural river channels, comprising an important component of aquatic habitat establishment (Photos 19, 21, 23, 24, 29, 30, and 35).

2.4 RESTORATION

Site restoration initially consisted of grading the proposed wetland restoration site and removal of the structural erosion and sedimentation controls. Subsequent flood flow deposition added approximately 3-4 ft of elevation to the proposed wetland restoration area, effectively precluding any potential for wetland restoration, though reestablishing a more stable floodplain elevation (Photos 25 and 26). The improved

access road was left in place at the request of the Town of Rocky Mount to provide better access to the farm field adjacent to the road terminus.

During breaching operations, an area immediately upstream of the dam on river left (adjacent to the powerhouse) was identified as having a significant scour hole due to turbulent flow adjacent to the dam prior to breaching (Photo 14). Additional scouring and bank failure after breaching threatened to form a headcut into the 9-acre wetland, effectively draining it. Restoration of the slope was completed though placement of stacked stone toe protection on September 20, 2016. Backfilling the scour hole to restore a stable slope configuration, placement of coir matting, and seeding with a native seed mix was completed on September 27, 2017.

River flow mitigated restoration through channel bed and bank feature adjustment began immediately after demolition work commenced and continues to progress, particularly during high flow events (Photos 18, 20-22, 26-32, and 35-41). Natural revegetation of banks is ongoing as bank slopes stabilize.

Subsequent restoration work entailed cutting downed trees that were blocking the upstream channel in several areas and causing significant bank stress and erosion. On March 2 and July 24, 2017, work crews used chainsaws to cut tree trunks into small sections to facilitate transport downstream. This work will be ongoing as bank adjustment continues to occur through headcuts and initial channel widening, prior to channel narrowing and stabilization at the restored floodplain and stream channel elevations.

3.0 MONITORING

3.1 GENERAL

In addition to the pre-breach monitoring, qualitative and quantitative monitoring will be conducted annually for 5 years. The purpose of monitoring is to monitor the formation of stable channel morphology up to 3.2 miles upstream and 5 miles downstream of the project and inform future management decisions. Stabilization metrics include the formation of riffles, pools, bars, benches, vegetated stream banks above ordinary high water; deposition; instream habitat; mobilization of sediment; and fish passage. A monitoring plan with methodology was submitted to interested regulatory agencies as part of VDEQ and U.S. Army Corps of Engineers permit requirements and included permanent surveyed channel cross sections, pebble counts, photography stations, sediment monitoring, and instream habitat quality assessments. Baseline studies conducted to evaluate the physical habitat, water chemistry, and biotic communities in the vicinity of the dam will be utilized for post-project monitoring. Fish sampling to determine upstream and downstream use of the restored sections of the Pigg River by Roanoke logperch and other fish species will be completed on an occasional basis. The first post-removal fish sampling occurred on August 22, 2017 (Photo 34). No Roanoke logperch were collected, though this was not unexpected given the high sediment load that

continued to be transported through the restoration area. Roanoke logperch are expected to recolonize these areas once channel stability is achieved throughout the restoration reach.

3.2 PHYSICAL

Post-dam breaching monitoring by Wetland Studies and Solutions, Inc. (WSSI) began in November 2016. A total of 12 cross sections were established. Six cross sections were taken upstream, including areas far enough upstream to be beyond former backwater effects created by the dam and 6 below the breached dam downstream to where effects of the sediment transported as a result of the dam breaching were anticipated to be minimal. Spacing of the cross sections was adjusted to focus on areas around the dam where the most significant river channel and bank adjustments were expected to occur (WSSI 2016). Cross section locations were also selected to correspond with previous sediment transport and biomonitoring (Hitt et al. 2009, Kris Bass Engineering 2015).

A comparison of cross section surveys between Year 0 and 1(Appendix B) shows slight streambed incision of approximately 1 ft at Cross Section 1, upstream of the former pool extent with increased degradation (downcutting) in Cross Sections 2-4 ranging from 2 to 7 ft at Section 4, approximately 0.8 mile upstream of the dam. Changes in channel cross sections at Sections 5 and 6 (0.37 and 0.05 mile, respectively) were less significant as a result of channel evolution that occurred between completion of dam breaching activities and post-construction monitoring when significant high flow events occurred. Colonization by herbaceous vegetation has provided stabilization in those areas where banks have ceased significant mass wasting. However, tension cracks are visible at cross sections where steep banks still exist and are exhibiting signs of mass failure (WSSI 2017).

3.3 BIOLOGICAL

Monitoring was conducted along 3 biological monitoring reaches for the project. The baseline conditions for this biomonitoring program were established by the Conservation Management Institute and the U.S. Geological Survey (Hitt et al. 2009). WSSI re-established the previously monitored biomonitoring reaches, which were monitored October 2017 as post-construction Year 1 and will be monitored again in Year 5. Each monitoring reach was collocated with a cross section: Reach A is at Cross Section 1, Reach B is at Cross Section 7, and Reach C is at Cross Section 8. Results of benthic sampling showed a slight decrease in Stream Condition Index scores at 2 of the 3 monitoring locations (WSSI 2017) in comparison to previous monitoring results (Hitt et al. 2009). The level of variation observed from pre-removal sampling events is within the range that may be reasonably expected and attributable to independent factors such as normal climatic variation. Future monitoring events will be necessary to determine the influence of dam removal on benthic communities (WSSI 2017).

3.4 HABITAT

The stream habitat assessment by WSSI was conducted in October 2017 using guidance established in the VDEQ Standard Operating Procedures for stream habitat assessment (VDEQ 2008) and the U.S. Environmental Protection Agency's Rapid Bioassessment Protocol for

habitat (Barbour et al. 1999). Habitat conditions were assessed by qualitatively rating 10 habitat parameters, including epifaunal substrate/available cover, embeddedness, velocity/depth regime, sediment deposition, channel flow status, channel alteration, frequency of riffles, bank stability, vegetative protection, and riparian vegetative zone width. The overall habitat quality of each reach was determined by adding together the individual metric scores to provide a Total Habitat Score at each reach, with a maximum of 200 points possible. Each reach was then assigned a narrative rating according to the total habitat score, where "Optimal" is 200-160, "Sub-Optimal" is 159-107, "Marginal" is 106-54, and "Poor" is 53-0. Reach A was determined to be in "Poor" condition primarily due to bank erosion with heavy deposits of material in the reach, increasing embeddedness, and resulting in an unstable substrate. Reach B was in "Marginal" condition, exhibiting moderately unstable banks with a lack of vegetation. Sediment deposition was also present in Reach B with various velocity/depth regimes and a fairly wide riparian zone. Reach C was in "Marginal" condition with moderately unstable banks, bare soil present and heavy deposition of fine material in the riverbed (WSSI 2017).

3.5 WETLAND

Hydrology, vegetation, and soil monitoring was initiated at 3 wetland sites adjacent to the former pool as a requirement of the VDEQ Water Protection Permit for the project. Moderate drought conditions were present during sampling. Soils at both Sites 3 and 4 (adjacent to Cross Section 2 and Cross Section 4, respectively) were a uniform sandy loam texture with no water or saturation observed in test pits. Two sampling locations were established at Wetland Site 2 (river left, just upstream of the dam) and hydric soil indicators were seen in both locations. No water or saturation was seen at Site 2, Point 1. Water was present at approximately 6 inches below surface elevation at Site 2 Point 2. Qualitative observations made during monthly monitoring well data collection has shown the Site 2 wetland area to be largely dry at the surface since June 2017. Wetland (hydrophytic) vegetation dominated all wetland sites (WSSI 2017).

All monitoring reports and other project related documents are available at:
https://www.fws.gov/northeast/virginiafield/partners/powerdam.html

4.0 OUTSTANDING REQUIREMENTS AND RELATED FUTURE WORK

In addition to the required monitoring, signage will be completed to provide the public assistance in interpreting the historic significance of the powerhouse and remnants of Pigg River Power Dam. That work is expected to be completed in 2018.

Future work at the site may include enhanced public boating and fishing access and the possible creation of a Franklin County public park.

5.0 CONCLUSIONS

The dam breaching and associated work is considered a success. The subsequent sediment transport downstream is resulting in reestablishment of more stable channel features, including channel narrowing, floodplain and inner berm benches, point bars, riffles, and pools (Photos 35 and 36). The former reservoir upstream of the dam is rapidly adjusting to a more stable channel (Photos 37-41), though complete stabilization is taking longer than anticipated in the sediment transport study and may take another year or more to fully stabilize.

6.0 REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for use in streams and wadeable rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water, Washington, D.C. 339 pp.

Froehling & Robertson, Inc. 2007. Sediment sampling and analysis study, Pigg River Power Dam, Franklin County, VA. Report to FishAmerica Foundation, Alexandria, VA.

Hill Studios. 2016. Phase II Survey Report, Rocky Mount Dam and Powerhouse, Franklin County, Virginia. Report to Friends of the Rivers of Virginia, Roanoke, VA.

Hitt, N.P., J. Jones and K. Convery. 2009. Biomonitoring for the Rocky Mount Power Dam removal project: Establishing baseline conditions. Conservation Management Institute, Blacksburg, VA.

Kris Bass Engineering. 2015. Power Dam sediment capacity and fate modeling. Report to the Service, Friends of the Rivers of VA, and Town of Rocky Mount, VA.

Mattern and Craig. 2015. Hydraulic Analysis Summary Report Pigg River Power Dam Removal, Franklin County, VA. Report to Friends of the Rivers of Virginia, Roanoke, VA.

Pezzoni and Associates. 2007. Rocky Mount Dam and Powerhouse (033-0016), Franklin County, Virginia, Survey Report and National Register Evaluation. Report to FishAmerica Foundation, Alexandria, VA.

U.S. Fish and Wildlife Service. 1992. Roanoke Logperch (*Percina rex*) Recovery Plan. Newton Corner, MA. 34 pp.

Virginia Department of Environmental Quality. 2008. Biological monitoring program quality assurance project plan for wadeable streams and rivers. Richmond, VA. 43 pp.

Wetland Studies and Solutions, Inc. 2016. Pigg River Restoration at Power Dam, Post Construction Monitoring Report. Report to Friends of the Rivers of Virginia, Roanoke, VA.

Wetland Studies and Solutions, Inc. 2017. Pigg River Restoration at Power Dam, Year-1 Monitoring Report. Report to Friends of the Rivers of Virginia, Roanoke, VA.

Figure 1

Power Dam Location Map

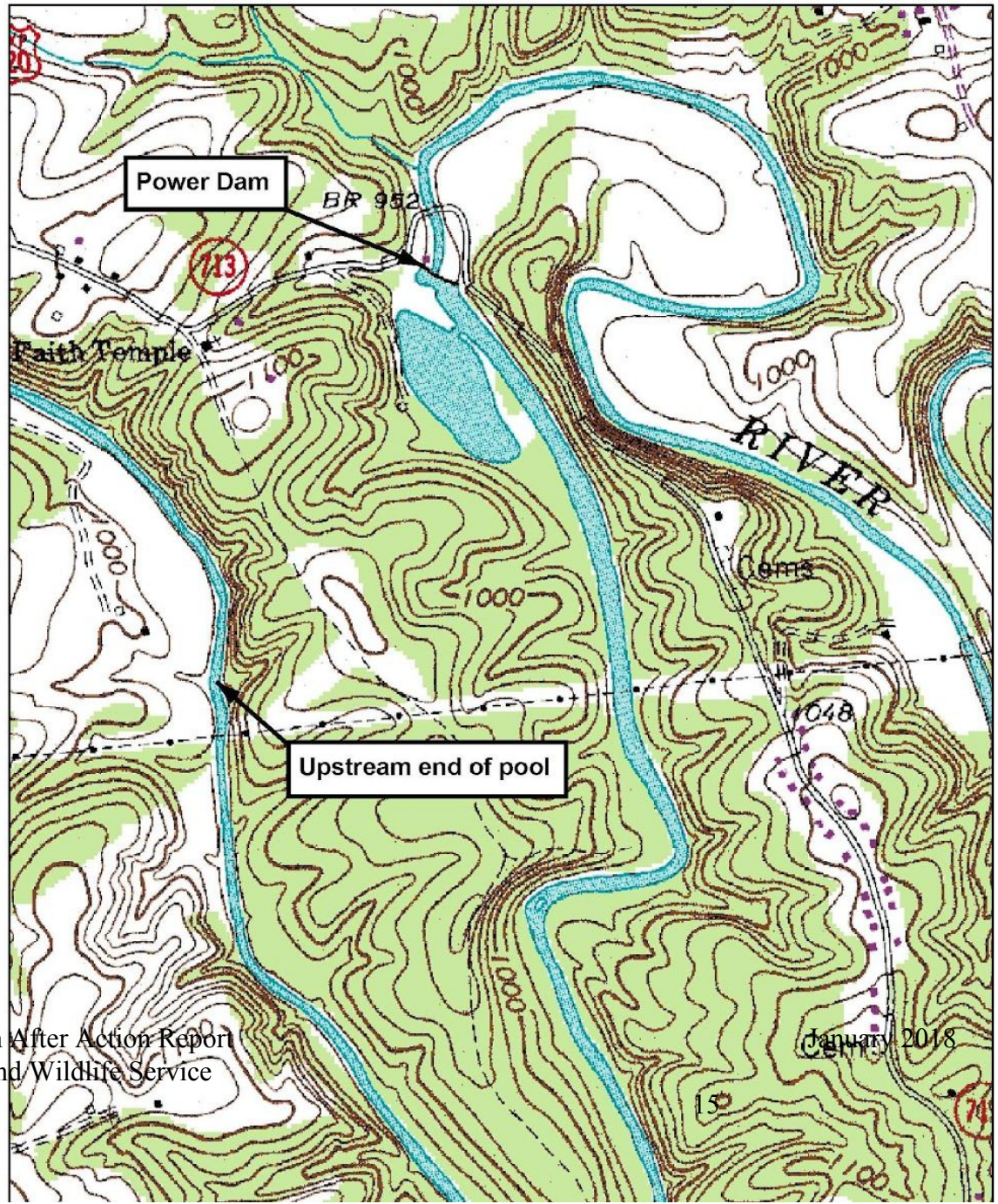
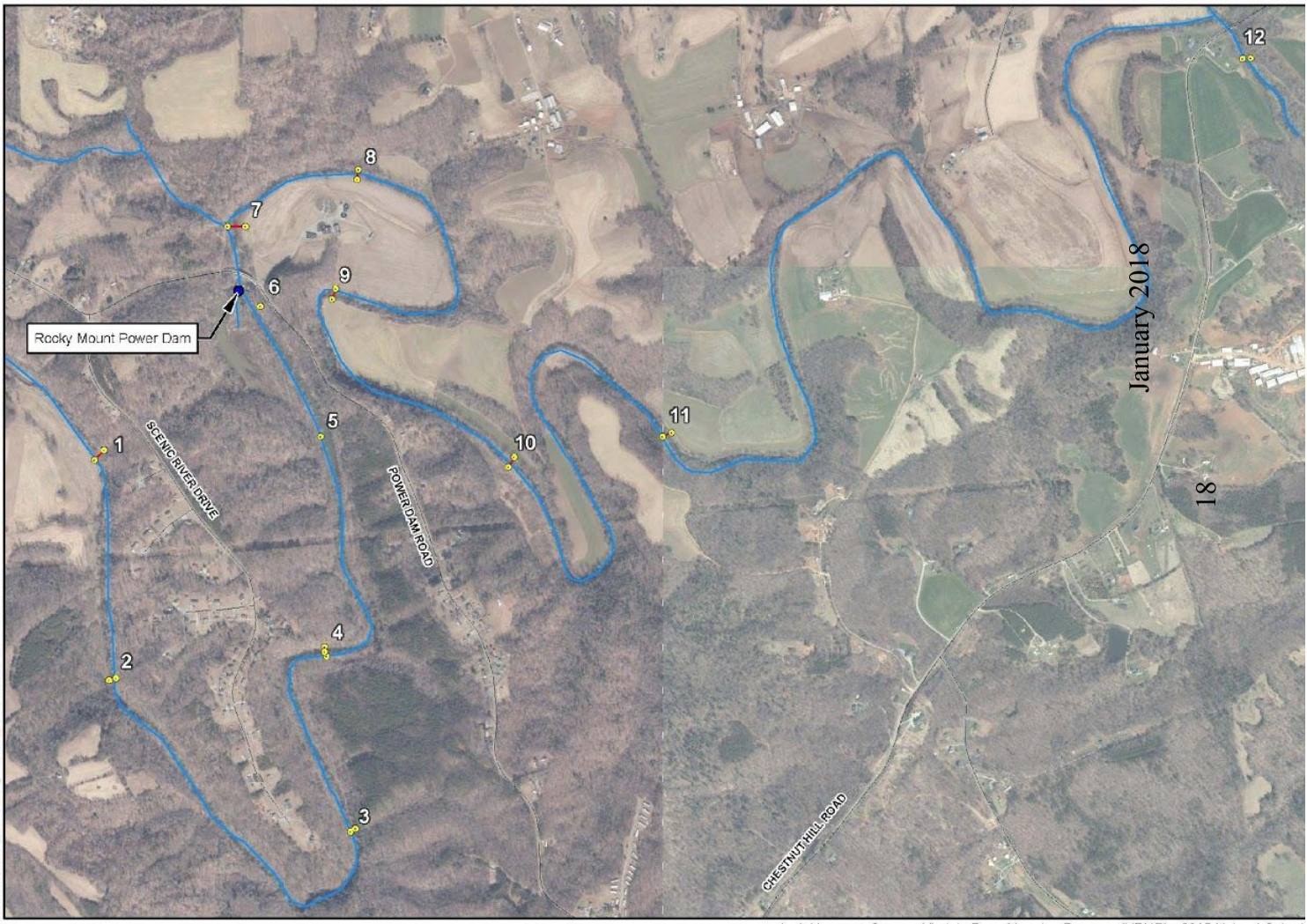


Figure 2

Power Dam Location Map

Figure 3. Proposed Sequential Notching and Final Notch Configura



Aerial Imagery Source: Virginia Base Mapping Program (VBMP) - 2015 Natural Color I

Wetland Studies and Solutions, Inc.
a DAVEY company

Figure 4. Post Construction Monitoring Locations

APPENDIX A

Photo documentation

1. Power Dam pre-removal view southwest from Route 7124 Bridge (10/8/15)

2. Power Dam during 3 inch rainfall event, view southwest (3/16/07)

3. Woody debris upstream of Power Dam blocking river channel pre-breach, causing adjacent flooding (1/26/06)

4. Typical levee formations on both right and left banks upstream of Power Dam pre-breach (11/17/15)

5. Typical upstream river channel within pool with high levees and shallow, sediment filled channels (11/17/15)

6. Over-widened channel and scour hole on right bank below Power Dam, view east (4/16/15)

7. View north, downstream of Power Dam depicting over-widened, sediment starved channel (4/16/15)

8. Pre-breach fish sampling in the scour pool below Power Dam, view east (8/25/16)

9. Access road down to floodplain causeway with silt fencing in place, view north (9/7/16)

10. Construction access causeway in place prior to removal, view north (8/25/16)

11. Initial dam breach, view southeast (8/29/216) (credit Franklin News Post)

12. Progress of breaching activities after one day of work, view southeast (8/30/16) (credit FORVA)

13. Woody debris removal behind Power Dam breach begins, view east (9/7/16)

14. Exposure of existing scour hole (red arrow) above Power Dam, potentially leading to wetland headcut (9/7/16)

15. Removal of woody debris above Power Dam (9/9/16)

16. Woody debris stockpile area, view northwest (9/9/2016)

17. Breach nearly complete, woody debris removal continues, view southeast (9/8/16)

18. River cutting channel through relict sediment immediately upstream of breach, view east (9/12/16) (credit FORVA)

19. Fine-tuning breach opening and stockpiling of material in former scour hole to restore floodplain bench (9/12/16)

20. View southeast (upstream) of dewatering of former pool upstream of breach (9/20/16)

21. View downstream (north) from Route 712 Bridge showing channel filling and formation (9/21/16)

22. View southeast (upstream) of channel formation in former pool sediment (9/21/16) (credit FORVA)

23. Sixty-five foot width base flow channel completed through Power Dam (9/22/16) (credit FORVA)

24. View of left bank upstream of dam after stacked stone toe, backfilling, and matting stabilization (10/5/16)

25. Floodplain deposition in downstream scour area during high flow event, view southeast (11/9/16) (credit FORVA)

26. Floodplain deposition on left and right banks below breach (2/2/17)

27. Bank sloughing and new floodplain bench upstream of the breach (2/2/17)

28. Narrowing of channel and restoration of meanders downstream below Route 712 Bridge (2/2/17)

29. Cobble and gravel sediment transport through breach in dam (5/25/17)

30. Additional coarse material deposition downstream between breach and Route 712 Bridge (5/25/17)

31. Floodplain bench and channel post fallen tree removal (breach in background) (8/2/17) (credit FORVA)

32. Establishment of a meander bend and bank revegetation upstream of breach (8/2/17) (credit FORVA)

33. Narrowed channel upstream and revegetation of newly formed floodplain (8/2/17) (credit FORVA)

34. Post-removal fish sampling with VDGIF and VDOT below breach (8/22/17)

35. Riffle re-established in former scour hole below Power Dam breach (9/26/17)

36. Stable cobble/gravel point bar on the inside of a meander bend downstream of breach below Route 712 Bridge (9/26/17)

37. Re-established river channel and vegetated floodplain upstream of breach. Arrow depicts pool elevation (9/26/17)

38. River channel and floodplain approximately 580 feet upstream of breach. Arrow depicts pool elevation (10/25/17)

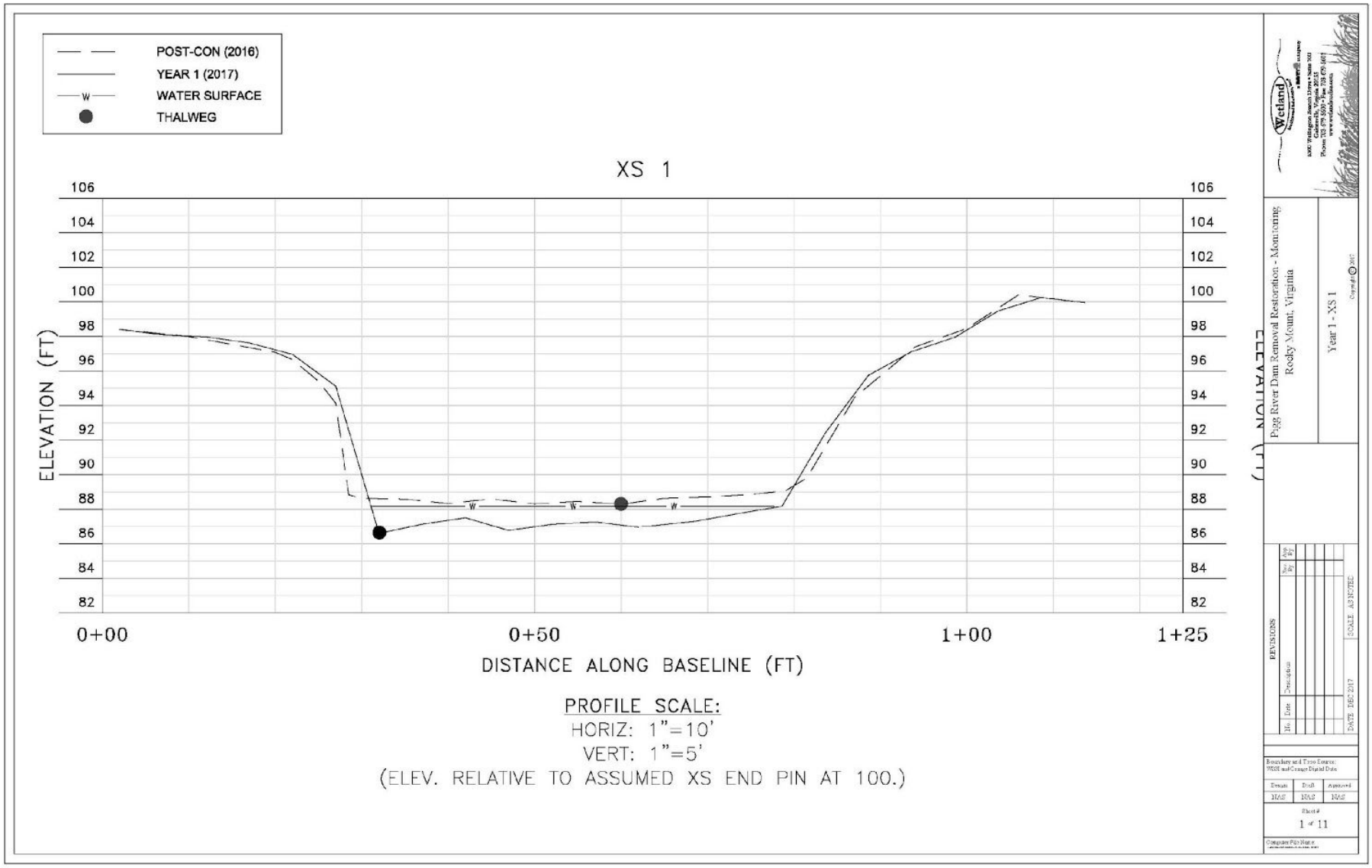
39. Same area from opposite side of the Pigg River illustrating high banks in area. Arrow depicts pool elevation (10/25/17)

40. Re-established river channel and vegetated floodplain 2,800 feet upstream of breach. Arrow depicts pool elevation (10/25/17)

41. Re-established meander bend and exposed rock outcrop approximately 3,100 feet upstream of breach (10/25/17)

APPENDIX B

Pre- and Post-Construction Cross Sections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Rocky Mount, Virginia
Year 1 - XS 1
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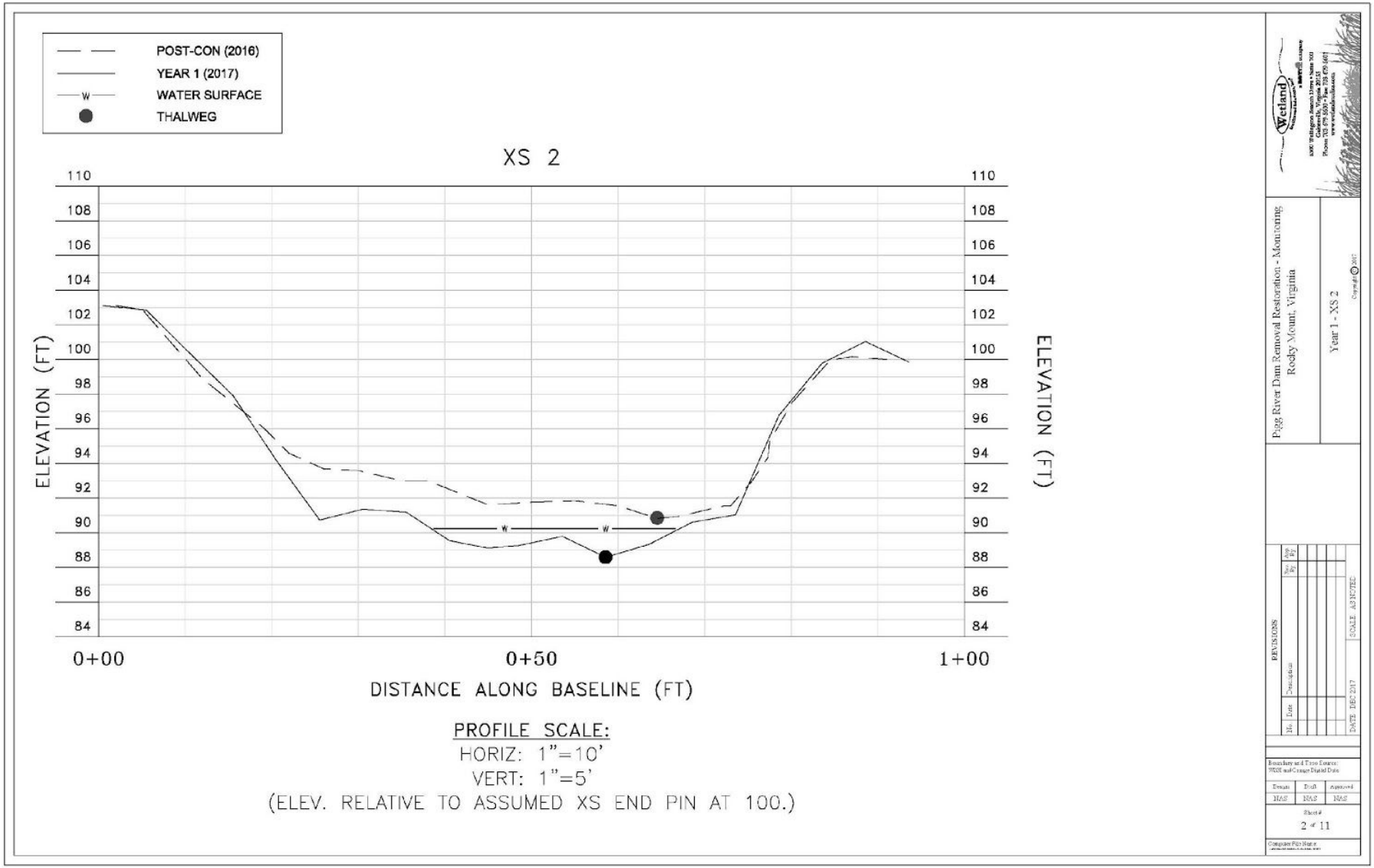
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Rocky Mount, Virginia
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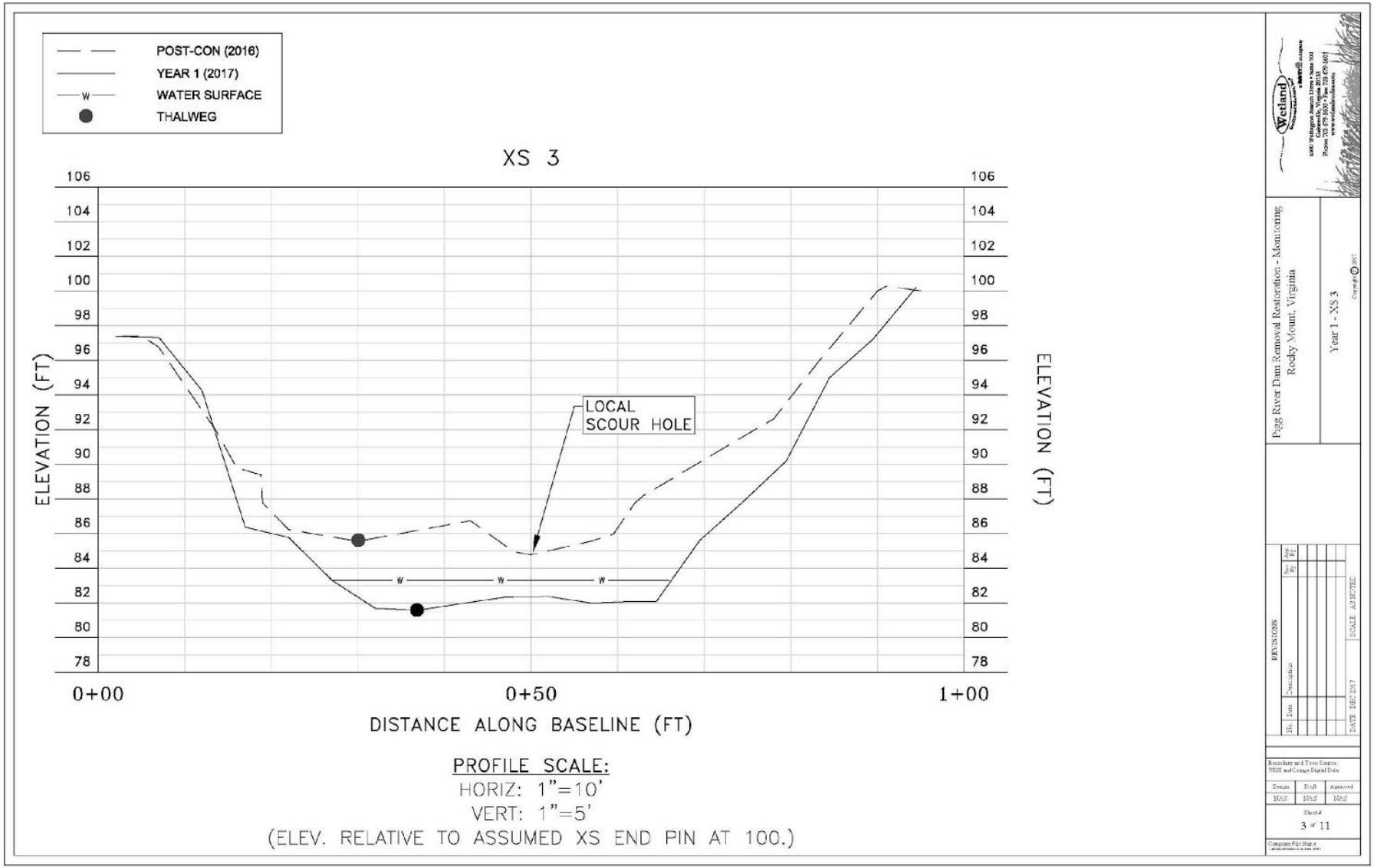
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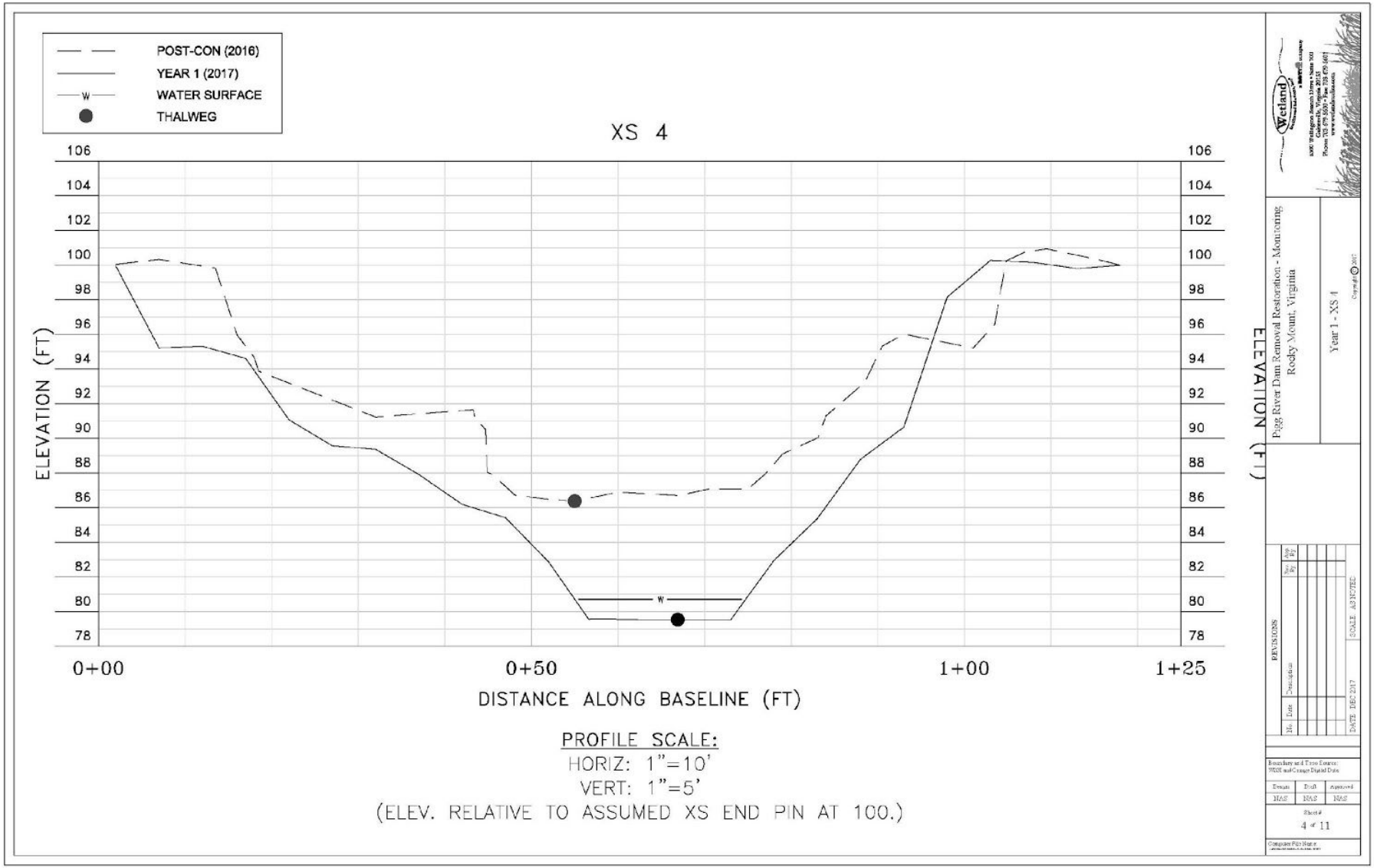
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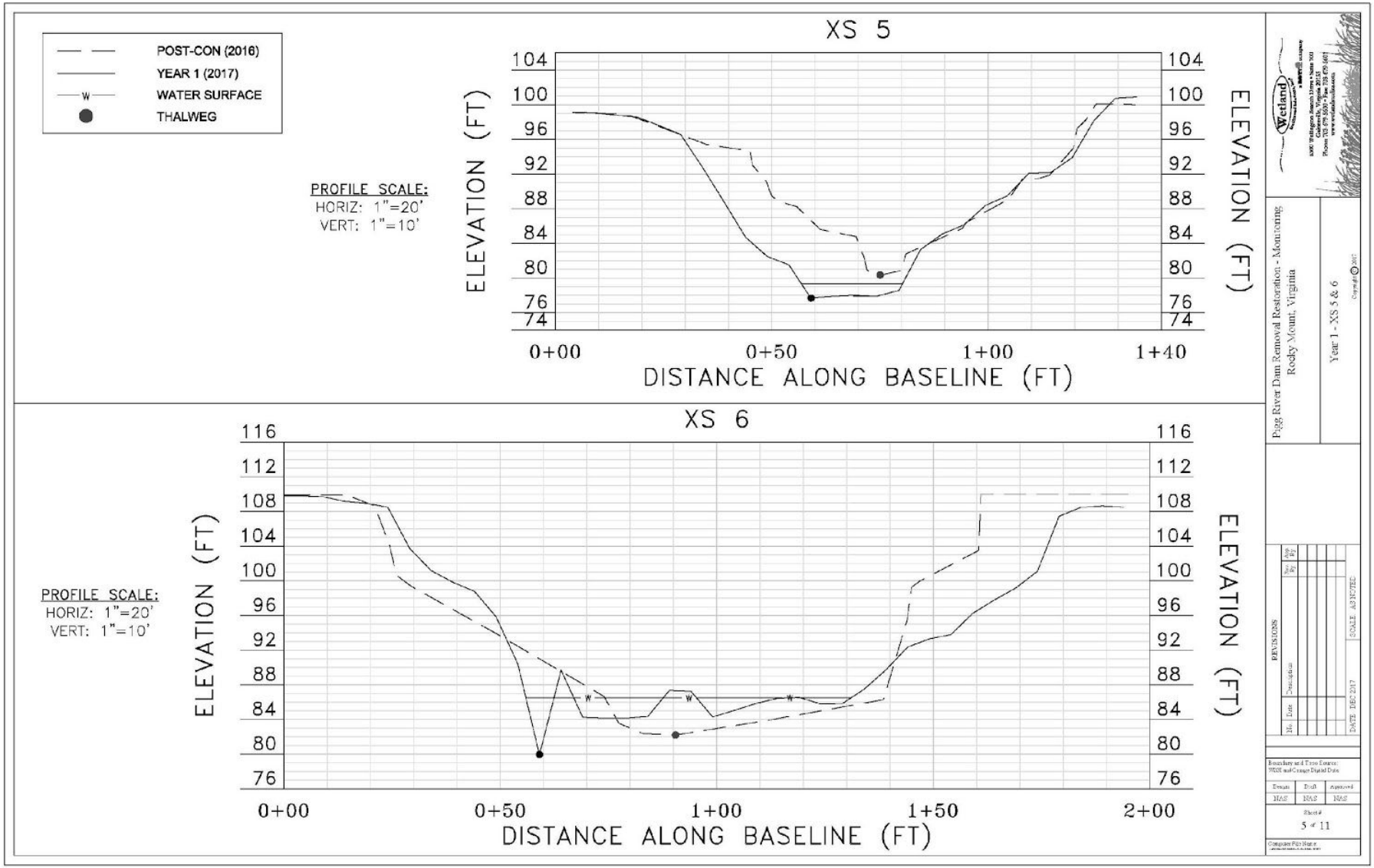
POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
PROFILE SCALE:
HORIZ: 1"=20'
VERT: 1"=10'
XS 5
ELEVATION (FT)
104
100
96
92
88
84
80
76
74
0+00
0+50
1+00
1+40
DISTANCE ALONG BASELINE (FT)
XS 6
116
112
108
104
100
96
92
88
84
80
76
0+00
0+50
1+00
1+50
2+00
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 5 & 6
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
Sheet #
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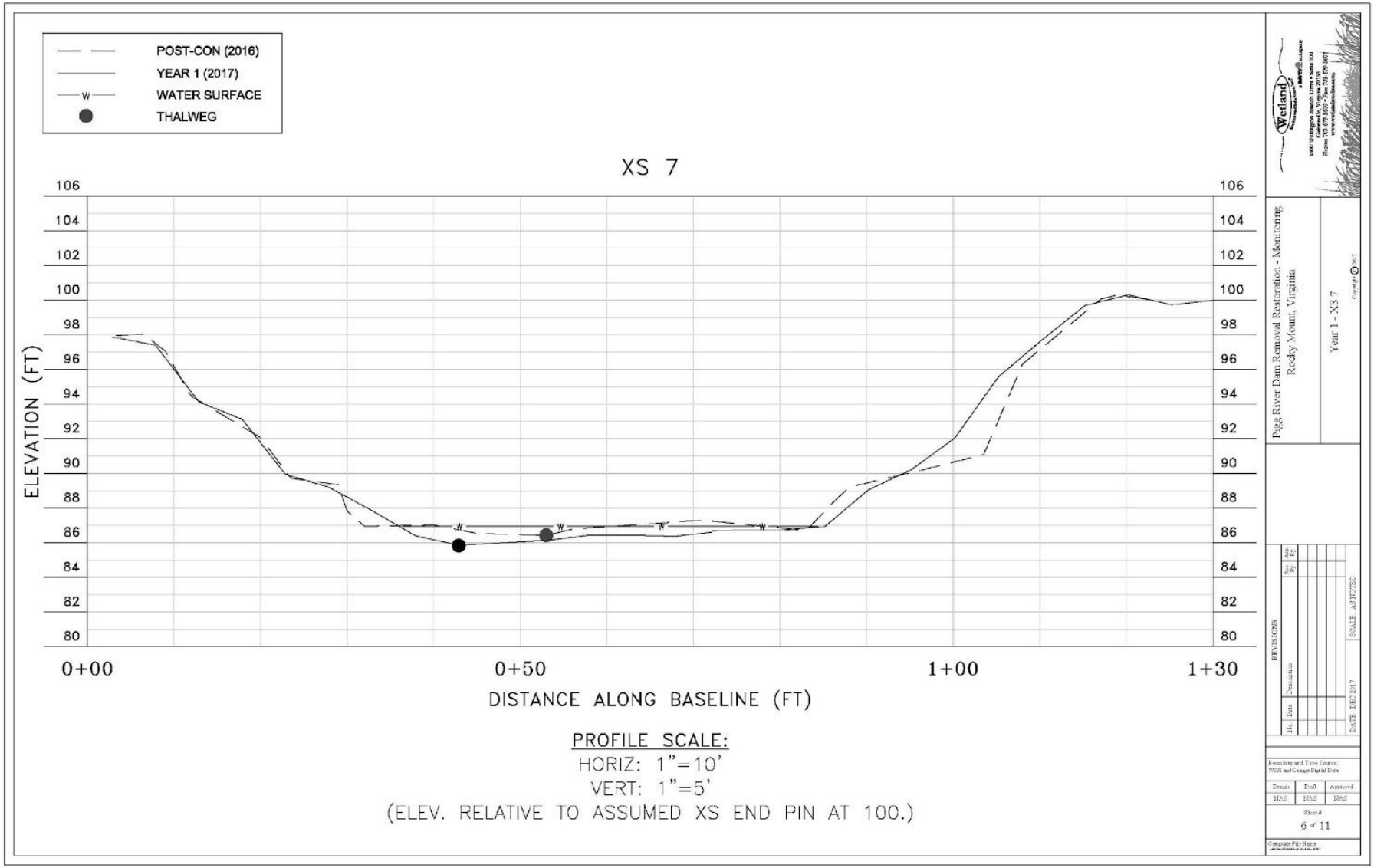
POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 7
ELEVATION (FT)
106
104
102
100
98
96
94
92
90
88
86
84
82
80
0+00
0+50
1+00
1+30
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 7
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
Sheet #
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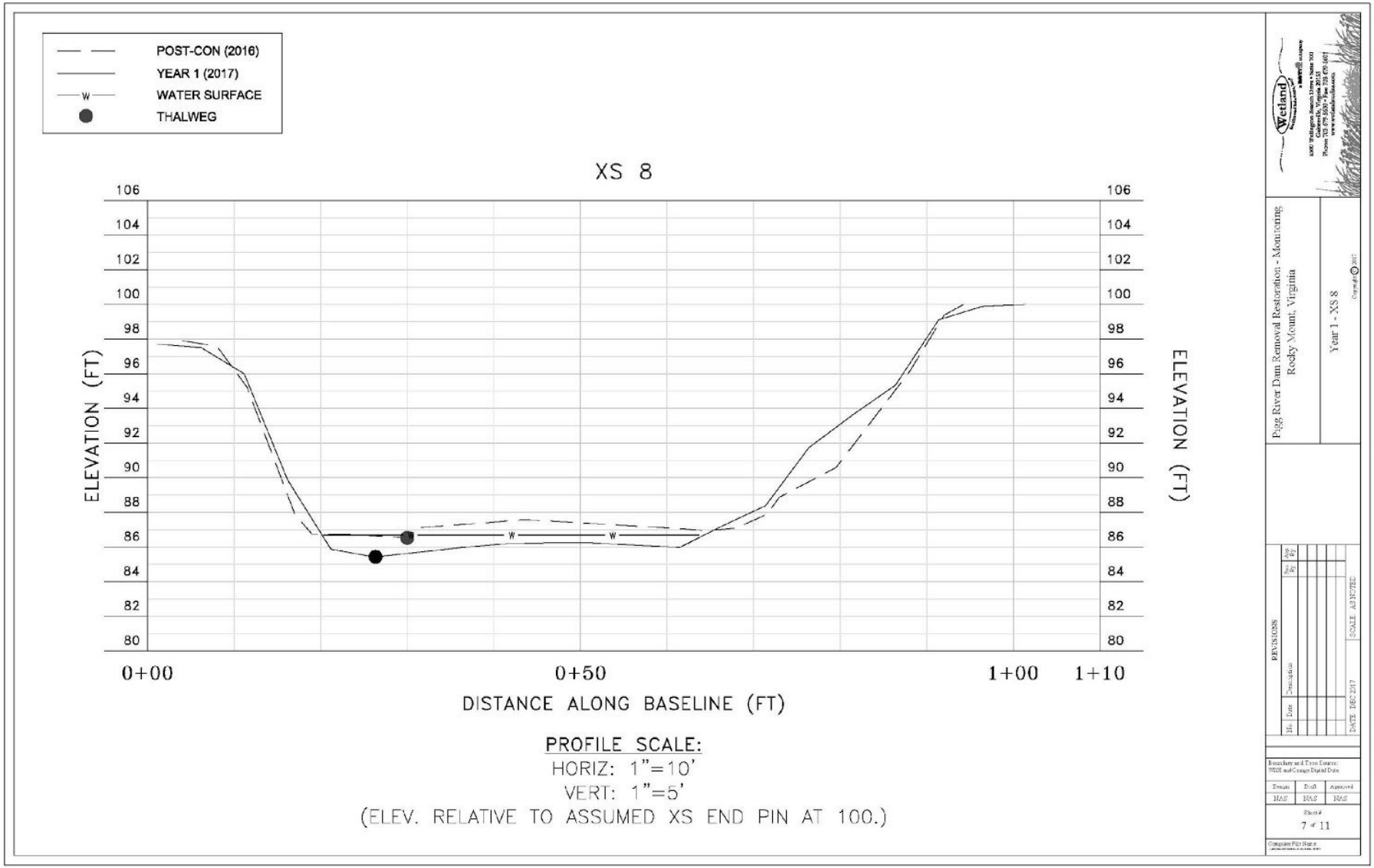
POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 8
ELEVATION (FT)
106
104
102
100
98
96
94
92
90
88
86
84
82
80
0+00
0+50
1+00
1+10
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 8
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
Sheet #
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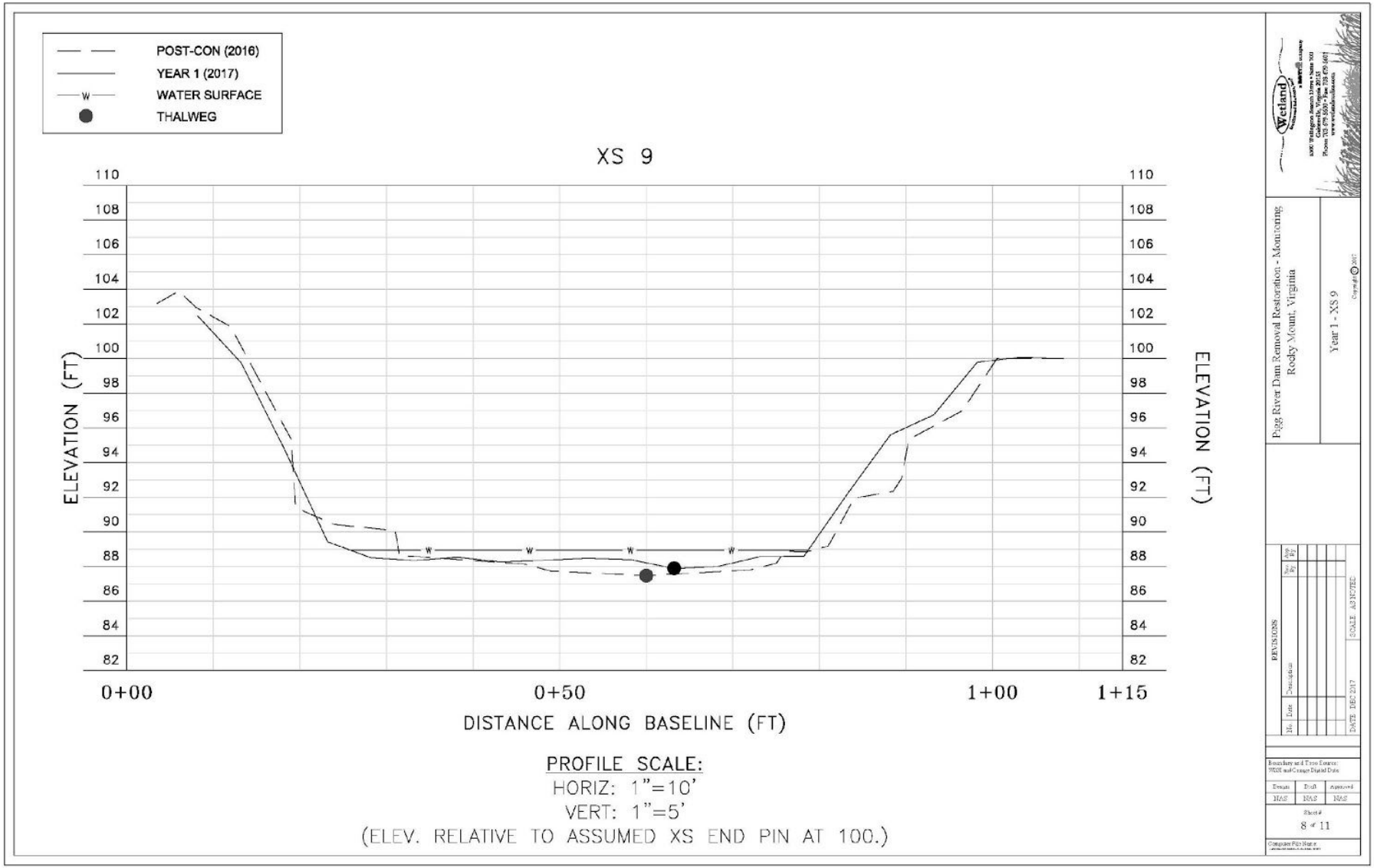
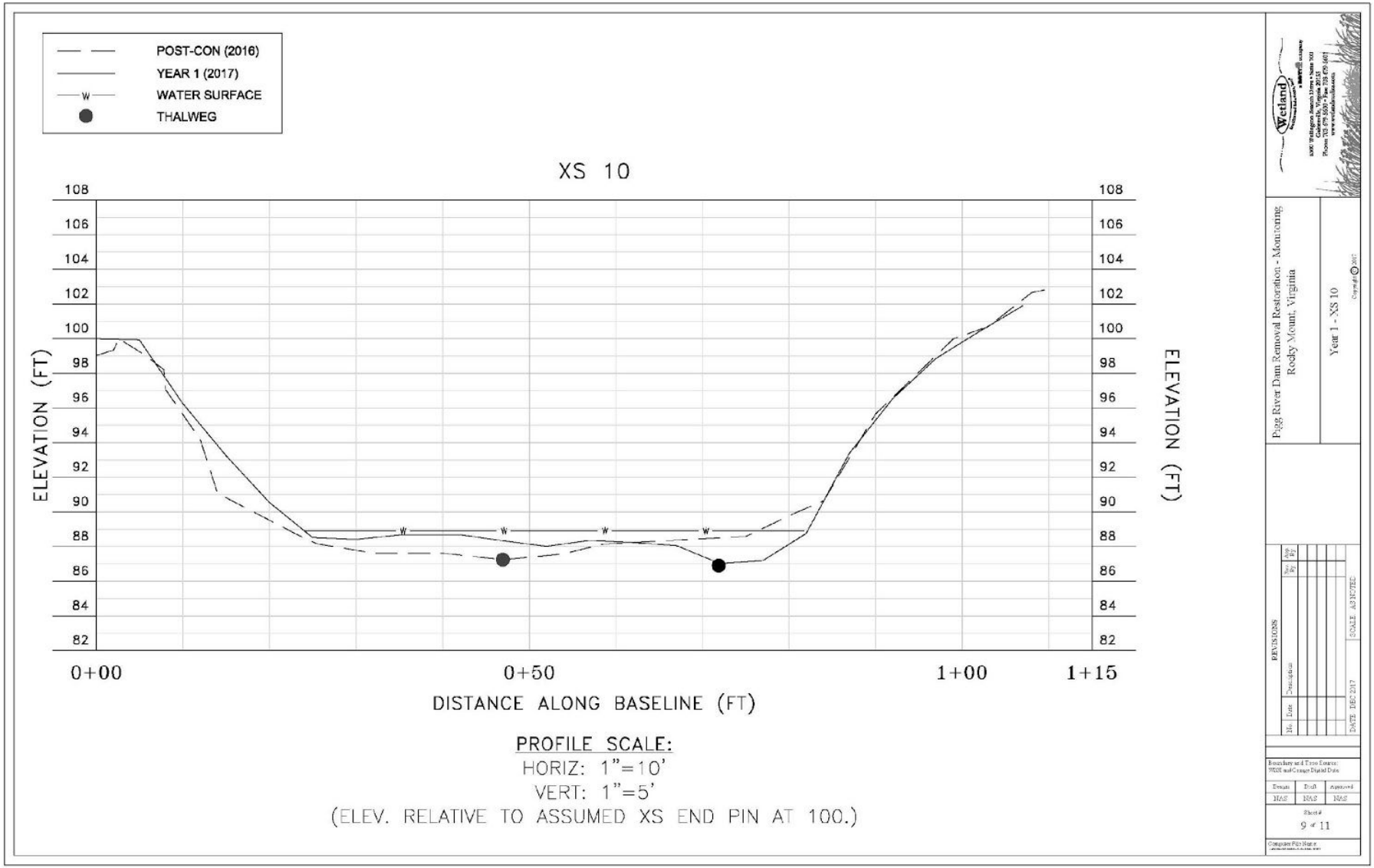

POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 9
ELEVATION (FT)
110
108
106
104
102
100
98
96
94
92
90
88
86
84
82
0+00
0+50
1+00
1+15
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Wetland Studies and Solutions, Inc.
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 9
REVISIONS
No. Date Description
DATE: DEC 2017
SCALE: AS NOTED
Boundary and Topo Source: WSSI and Cowger Digital Data
Drawn: MAS
Dsgn: MAS
Approved: MAS
Sheet # 8 of 11


POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 10
ELEVATION (FT)
108
106
104
102
100
98
96
94
92
90
88
86
84
82
0+00
0+50
1+00
1+15
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 10
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
Sheet #
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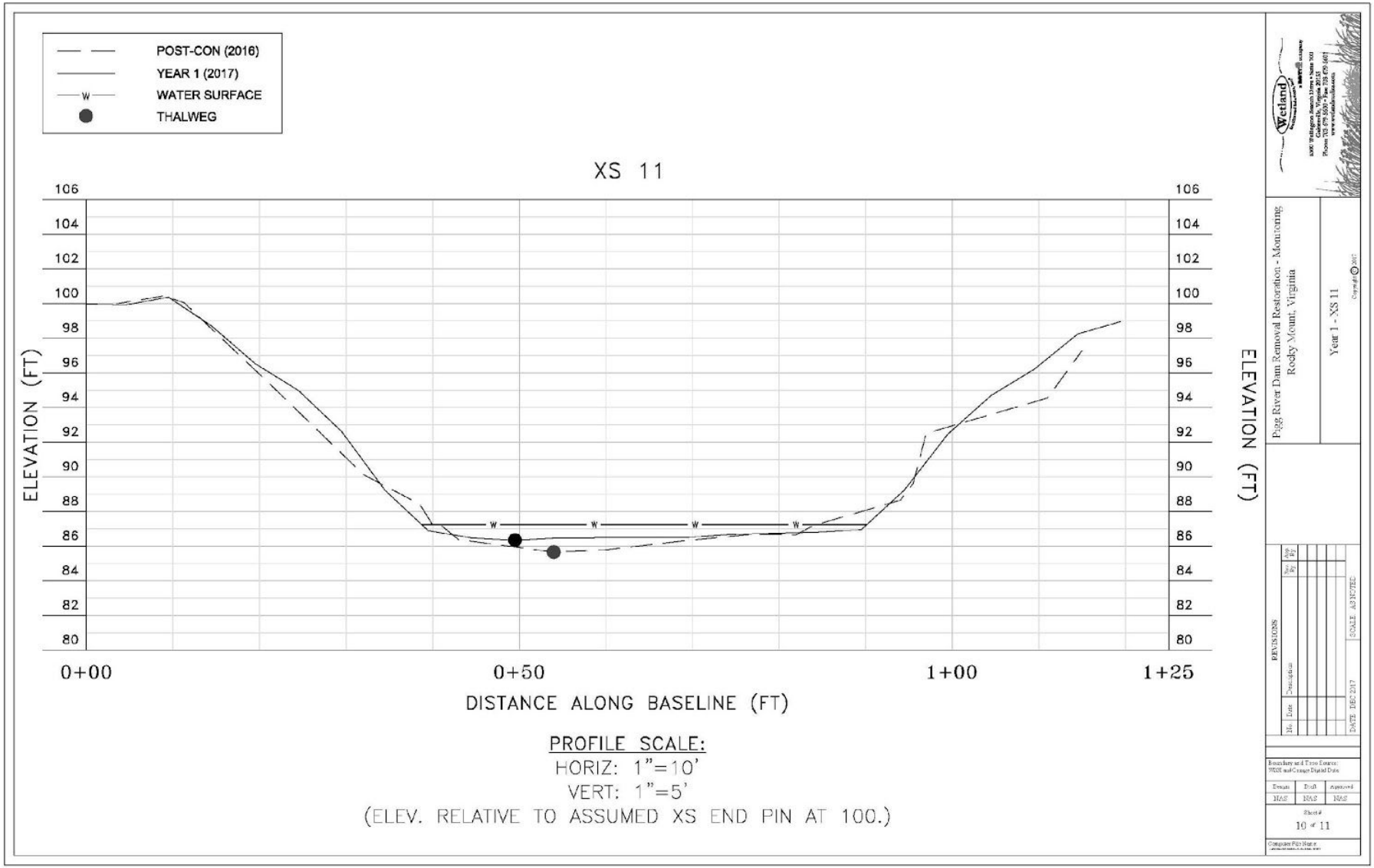
POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 11
ELEVATION (FT)
106
104
102
100
98
96
94
92
90
88
86
84
82
80
0+00
0+50
1+00
1+25
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 11
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
Sheet #
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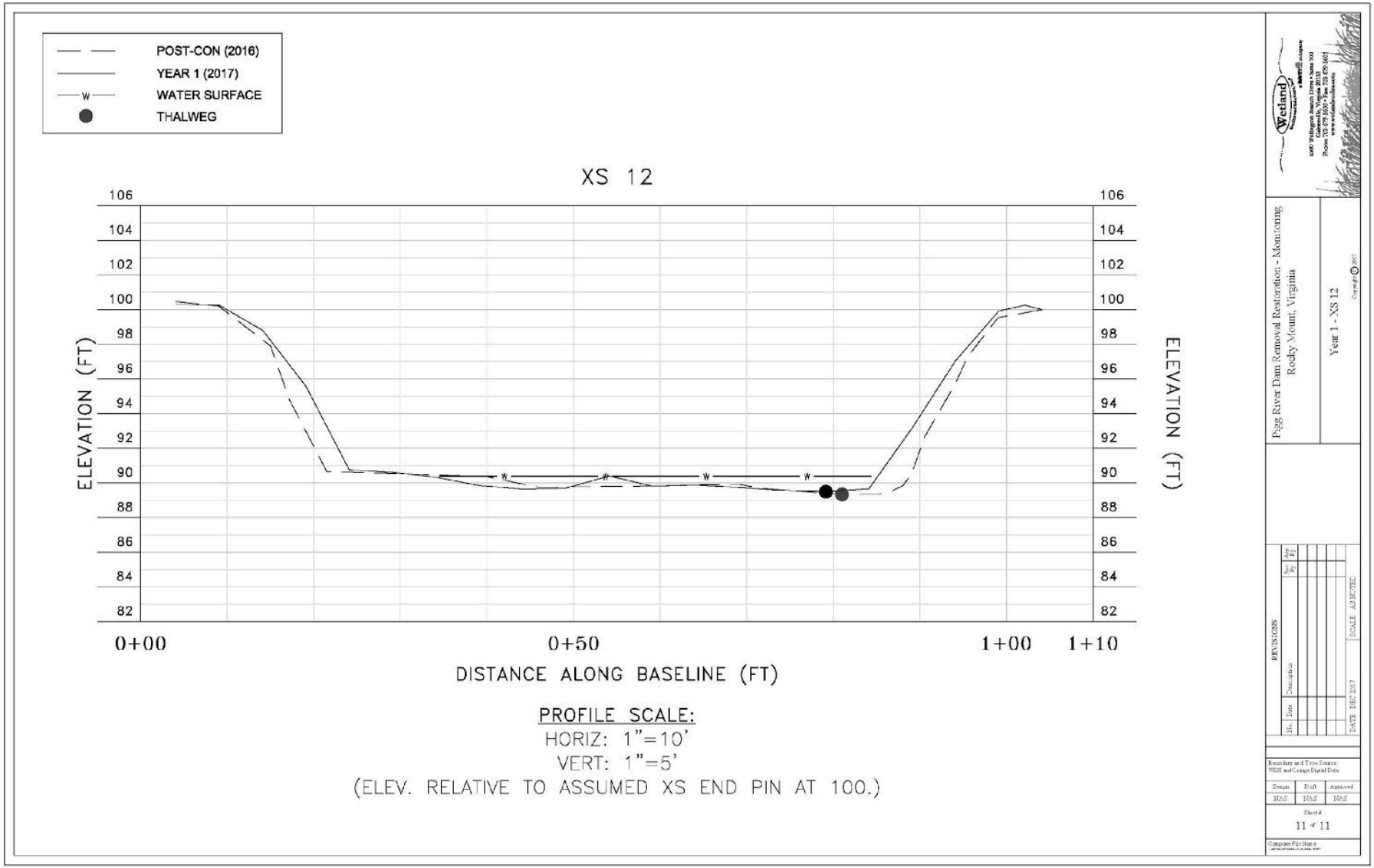
POST-CON (2016)
YEAR 1 (2017)
WATER SURFACE
THALWEG
XS 12
ELEVATION (FT)
106
104
102
100
98
96
94
92
90
88
86
84
82
0+00
0+50
1+00
1+10
DISTANCE ALONG BASELINE (FT)
PROFILE SCALE:
HORIZ: 1"=10'
VERT: 1"=5'
(ELEV. RELATIVE TO ASSUMED XS END PIN AT 100.)
Pigg River Dam Removal Restoration - Monitoring
Rocky Mount, Virginia
Year 1 - XS 12
REVISIONS
DATE: DEC 2017
SCALE: AS NOTED
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